

Hallmark Industry Day

Cognitive Engineering Information and Phase 0

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Cognitive Engineering (CE) Approach

- **Working definition** -“an approach to the design of technology, training, and processes intended to manage cognitive complexity in sociotechnical systems.” (Militello et al, 2009)
- **Key differentiator** – CE in design and development ✉ testing and evaluation
- **Partner** – CE understanding utilizing autonomy/automation as part of the operations test bed

Proposal should include – Your “cognitive engineering approach for assessment of the comprehensive evaluation of the entire integrated Hallmark system”



Overarching CE Approach to TA1

- The following topic areas should be considered as an interwoven concept for all tool development:
 - **Mental Models and Macro-cognitive Approaches** to include naturalistic decision making, sense-making, planning, adaptation/re-planning, problem detection, coordination, developing mental models, uncertainty management, and attention management. [Letksy, 2008]
 - **Advanced Decision Making Models** that expand beyond situation awareness models to enable a commander's ability to understand trade-offs of various courses of action under consideration



Key CE Elements

- Evaluation metrics should reflect key elements of programmatic metrics
- Metrics can range from collection of meta-data within the TA1 and TA2 testbed to more biometric approaches

Phase I candidate metrics

- Successfully evaluate at least **one** threat scenario
- Floor operations leader understands the integrated COP
- Operational team provides **recommendation** with confidence level **under ten hours**

Phase II candidate metrics

- Successfully evaluate at least **three** scenarios in two orbital regimes
- Comprehension of at least three COAs per scenario
- Provide recommendation with confidence level under **five hours**
- **Shared situational awareness** (**70%** passes evaluation testing)
- Information **confidence** (**70%** information output is reliable)

Phase III candidate metrics

- Successfully evaluate at least **six** scenarios in all orbital regimes
- Comprehension of at least three COAs per scenario
- Provide recommendation with confidence level under **2.5 hours**
- Shared situational awareness (**90%** passes evaluation testing)
- Information confidence (**90%** information output is reliable)



Human Subject Research

- Human Subject Research may be required; if so TA2 performers should collaborate with TA1 performers for Institutional Review Board approval
- Timeline
 - TA1 performers after award
 - TA2 draft HSR plan upon submission, please review the HSR presentation as related to the DoD process
- If questions, return to program metrics





Hallmark Phase 0

- Gain insight to inform Phases 1-3 program
- Three events with varying classifications
- One participatory design event led by MITRE
- Site-visit trip reports and SharePoint reference material
- Lessons Learned
 1. Business process
 2. Course of Action tools
 3. Recommendation with confidence level
 4. Multiple communication modalities
 5. Multi-domain support





Participatory Design Events

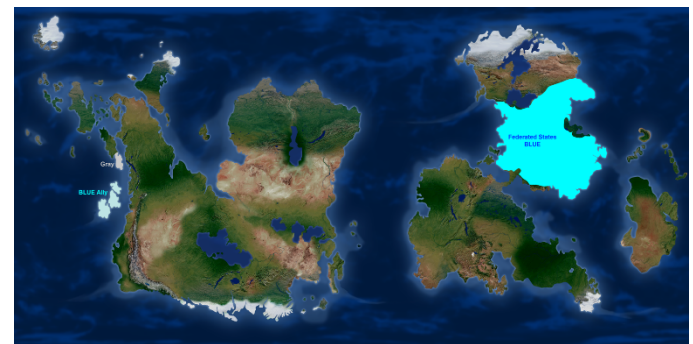
- A government partner will execute events around a particular topic area
- Participatory design is a process that involves developers, business representatives, and users working together to design a solution. It actively involves users in the design process to help ensure that the product designed meets their needs and is usable in the process. (usabilitybok.org)
- The output of this session will enable each Technical Area to advance into the next cycle, including:
 - Goals for tool development and user interface improvements (TA1)
 - Insights to catalyze the development of new, challenging scenarios and testing regimens (TA2)





Phase 0

- SEPT 2016
- Applied Defense Solutions, MITRE, JHU/APL, USfalcon
- Approximate ~10 hours operational time over 2 days
- Simulated timeline utilized jumps instead of multiple X time
- 10 Operators with cross domain backgrounds
 - Allied space
 - Government space
 - Intel



Engagement and team communication was key



Visualization and Team SA





Decision Maker Brief





Questions